Drinking Water Surveillance Program

KINGSTON WATER TREATMENT PLANT

Annual Report 1987

Environment Ontario
Jim Bradley, Minister

91-05966/

ISSN 0839-9050

KINGSTON
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1987

ONTARIO MINISTRY OF ENVIRONMENT
OCTOBER 1988

c Queen's Printer for Ontario, 1988

ACKNOWLEDGEMENTS

The Drinking Water Surveillance Program (DWSP) employs a team approach requiring the co-operative effort of the Ministry of the Environment (MOE) staff from Water Resources and Laboratory Services Branch and the Regions, as well as plant operational staff from the Municipalities.

This annual report was produced by the DWSP Group (Ron Hunsinger, Peter Bohm, Carol Sackville-Duyvelshoff, Chris Fung and John McGrachan) and by Pat Lachmaniuk (on developmental assignment to the Drinking Water Section). Helpful input and reviews were received from Drinking Water Section Staff, in addition to reviews by other MOE and municipal personnel.

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

KINGSTON WATER TREATMENT PLANT 1987 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored.

The Kingston Water Treatment Plant is a conventional treatment plant which treats water from Lake Ontario. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant serves a population of approximately 81,000 people and has a design capacity of 94.4 x 1000m3/day.

Water samples from the raw, treated and two distribution sites were taken on a monthly basis and analyzed for approximately 160 parameters, 12 times during 1987. Parameters were divided into the following groups Bacteriological, Inorganic and Physical(Laboratory Chemistry, Field Chemistry and Metals) and Organics (Chloroaromatics, Chlorophenols, Pesticide and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles). Specific Pesticides and Chlorophenols were analysed for in June and November only.

A summary of results is shown in Table 1.

Due to its sampling frequency, the DWSP is not designed to evaluate all aspects of the bacteriological quality of the water; however routine bacteriological monitoring as outlined in the Ontario Drinking Water Objectives (ODWOs) is carried out by the operating authority. In terms of the limited DWSP bacteriological examination, the water was of good quality.

Inorganic and Physical parameters (Laboratory Chemistry, Field Chemistry and Metals) were below any applicable health related ODWOs.

Of approximately 110 Organic parameters tested for on a monthly basis, none exceeded health related guidelines.

Many of the substances detected are naturally occurring or treatment by-products.

During 1987 the DWSP sampling results indicated that the Kingston Water Treatment Plant produced good quality water at the plant and this quality was maintained throughout the distribution system.

SOMMAIRE

PROGRAMME DE SURVEILLANCE DE L'EAU POTABLE

STATION D'ÉPURATION DE L'EAU DE KINGSTON
RAPPORT ANNUEL 1987

Le Programme de surveillance de l'eau potable (PSEP) de l'Ontario fournit des informations immédiates, fiables et à jour sur la qualité de l'eau potable. Le PSEP a débuté officiellement en avril 1986. Il est destiné à englober tous les réseaux municipaux d'alimentation en eau de l'Ontario. Actuellement, 44 stations en font partie.

La station d'épuration de Kingston est une station classique qui traite l'eau du lac Ontario. Le traitement comporte la coagulation, la floculation, la décantation, la filtration et la désinfection. La station dessert une population d'environ 81 000 habitants et a une capacité nominale de 94,4 x 1 000 m3/jour.

Des prélèvements d'eau brute et d'eau traitée ainsi qu'en deux points du réseau de distribution ont été effectués chaque mois. Douze fois en 1987, ces prélèvements ont été analysés par rapport à environ 160 paramètres dans les catégories suivantes : bactériologique, inorganique et physique (analyses en laboratoire et sur place, présence de métaux) et organique (composés aromatiques chlorés, chlorophénols, pesticides et BPC, dérivés phénoliques, hydrocarbures aromatiques polynucléaires, pesticides particuliers et composés volatils). Les chlorophénols et les pesticides particuliers n'ont été analysés qu'en juin et en novembre.

Le tableau 1 résume les résultats obtenus.

En raison de la fréquence des prélèvements, le PSEP ne permet pas d'évaluer tous les aspects de la qualité bactériologique de l'eau. Cependant, comme on le recommande dans le cadre des objectifs relatifs à la qualité de l'eau potable en Ontario, un contrôle bactériologique est effectué par l'exploitant. L'analyse bactériologique limitée du PSEP a révélé une eau de bonne qualité.

Les mesures des paramètres inorganiques et physiques étaient inférieures aux limites applicables fixées par l'Ontario pour l'eau potable.

Pour environ 110 paramètres organiques mesurés chaque mois, aucun résultat n'a dépassé les limites acceptables fixées pour la santé.

Un grand nombre de substances détectées apparaissent naturellement ou sont des produits dérivés de l'épuration.

Les résultats des analyses effectuées en 1987 dans le cadre du PSEP ont indiqué que la station d'épuration de Kingston donnait une eau de bonne qualité et que cette qualité se maintenait dans tout le réseau de distribution.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE BY SCAN (1987)

SCAN	RAW			TREATED			SITE 1			SITE 2		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	48	41	85	53	10	18	46	15	32	47	13	27
CHEMISTRY (FLD)	36	36	100	72	72	100	90	90	100	88	88	100
CHEMISTRY (LAB)	225	192	85	208	142	68	381	320	83	393	328	83
METALS	243	128	52	243	106	43	454	223	49	471	230	48
CHLOROAROMATICS	156	0	0	156	0	0	143	1	0	130	1	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	51	0	0	51	0	0	.	.	.	.	.	.
PESTICIDES & PCB	297	0	0	297	0	0	273	0	0	251	0	0
PHENOLICS	12	1	8	12	1	8	1	0	0	1	0	0
SPECIFIC PESTICIDES	162	0	0	162	0	0	99	0	0	99	0	0
VOLATILES	339	3	0	338	48	14	337	48	14	338	48	14
TOTAL	1581	401		1604	379		1824	697		1818	708	

NO HEALTH RELATED GUIDELINES/LIMITS WERE EXCEEDED

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

KINGSTON WATER TREATMENT PLANT
1987 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored. Appendix A contains a detailed description of the DWSP.

The DWSP was initiated at the Kingston Water Treatment Plant in January of 1986. An annual report was published for 1986 (ISBN 0-7729-2557-7).

This report contains information and results for 1987.

PLANT DESCRIPTION

The Kingston Water Treatment Plant is a conventional treatment plant which treats water from Lake Ontario. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. Sulphur Dioxide is added as part of the disinfection process to adjust the chlorine residual prior to final chlorination. This plant serves a population of

approximately 81,000 people. It has a design capacity of 94.4 x 1000m3/day and daily flows ranging from 47 x 1000m3/day to 67 x 1000m3/day.

The plant location is shown in Figure 1. Plant Process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

METHODS

Water samples were obtained from four DWSP approved locations;

i) Plant Raw - The water originated from the wet well prior to chlorination and was sampled through a copper line. The sample tap is located in the plant laboratory.

ii) Plant Treated - The water originated from the highlift discharge after addition of all treatment chemicals and was sampled through a copper line. The sample tap is located in the plant laboratory.

iii) Distribution System - Site 1 - This house is approximately 4.13 kilometers from the plant. Water was sampled through copper plumbing from the basement laundry tap.

iv) Distribution System - Site 2 - This house is approximately 5.7 kilometers from the plant. Water was sampled through copper plumbing from the basement laundry tap.

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

SITE LOCATION MAP

LOCATION: KINGSTON WATER TREATMENT PLANT

FIGURE 2

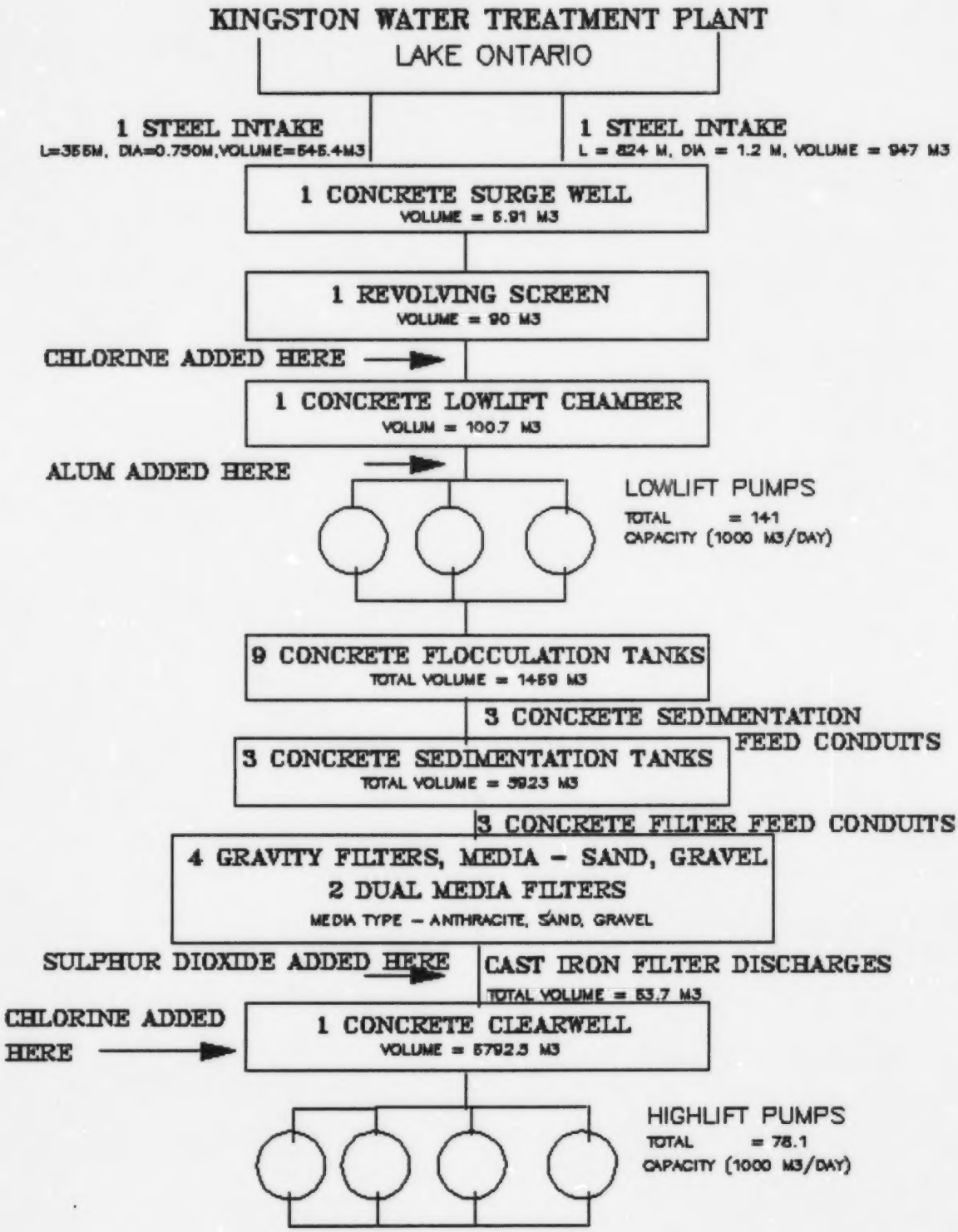
KINGSTON WATER TREATMENT PLANT
LAKE ONTARIO
1 STEEL INTAKE
L=355M, DIA=0.750M,VOLUME=545.4M3
1 STEEL INTAKE
L = 824 M, DIA = 1.2 M, VOLUME = 947 M3
1 CONCRETE SURGE WELL
VOLUME = 5.91 M3
1 REVOLVING SCREEN
VOLUME = 90 M3
CHLORINE ADDED HERE
1 CONCRETE LOWLIFT CHAMBER
VOLUM = 100.7 M3
ALUM ADDED HERE
LOWLIFT PUMPS
TOTAL = 141
CAPACITY (1000 M3/DAY)
9 CONCRETE FLOCCULATION TANKS
TOTAL VOLUME = 1459 M3
3 CONCRETE SEDIMENTATION
FEED CONDUITS
3 CONCRETE SEDIMENTATION TANKS
TOTAL VOLUME = 5923 M3
3 CONCRETE FILTER FEED CONDUITS
4 GRAVITY FILTERS, MEDIA - SAND, GRAVEL
2 DUAL MEDIA FILTERS
MEDIA TYPE - ANTHRACITE, SAND, GRAVEL
SULPHUR DIOXIDE ADDED HERE
CAST IRON FILTER DISCHARGES
TOTAL VOLUME = 53.7 M3
CHLORINE ADDED
HERE
1 CONCRETE CLEARWELL
VOLUME = 5792.3 M3
HIGHLIFT PUMPS
TOTAL = 78.1
CAPACITY (1000 M3/DAY)

TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

KINGSTON WATER SUPPLY SYSTEM

LOCATION:	302 KING STREET WEST KINGSTON, ONTARIO K7L 2X1 (613-542-1763)
SOURCE:	RAW WATER SOURCE - LAKE ONTARIO
RATED CAPACITY:	45.5 (1000 M3/DAY)
OPERATION:	MUNICIPALITY
PLANT SUPERINTENDENT:	K. ALLEN
MINISTRY REGION:	SOUTHEAST
DISTRICT OFFICER:	MR. J.F. PRUNER

MUNICIPALITY SERVED	POPULATION
KINGSTON	60,500
PART OF PITTSBURGH TOWNSHIP	1,600
CFB, KINGSTON	4,500

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At both distribution system locations two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples are used to make an assessment of the amount by which the levels inorganic compounds and metals may be changed on standing due to leaching from (or deposition on) the plumbing system. The only analyses carried out on these samples therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution main that had been flowing for five minutes before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to eliminate any variance (Appendix B).

Sample day flow, treatment chemical dosages and Field Chemistry measurements were recorded on the day of sampling and were entered on the DWSP database as submitted.

RESULTS

Water at the Kingston Water Treatment Plant was sampled for approximately 160 parameters on a monthly basis 12 times in 1987. The Specific Pesticides and Chlorophenols scans were sampled for in June and November only. Polynuclear Aromatic Hydrocarbons and Phenolics are only analysed for in the raw and treated water at the plant.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed for by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes

that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 presents parameters not detected.

Associated guidelines and detection limits are also supplied on both tables. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publication (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters. These are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameters Listing System (PALIS) recently initiated by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world.

As stated under Results, traces do not indicate quantifiable values, as defined by established MOE Laboratory analytical

reporting protocols. While they can be useful in trend analysis or confirmation of a specific contaminant that is repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. **DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.**

Bacteriology

Positive results for the Bacteriology scan were present ten times in the treated water, fifteen times in the distribution system Site 1 water and thirteen times in the Site 2 water. The positive parameters were Standard Plate Count, Total Coliform and/or Total Coliform Background and Presence/Absence Test.

Total Coliforms were detected by the membrane filtration method at approximately 9 counts/mL in the distribution system Site 1 water for September. Coliforms were not detected in the Presence/Absence test and the high Total Coliform Background counts indicate possible contamination of the samples.

Due to its sampling frequency of once per month, the DWSP is not designed to evaluate all aspects of the bacteriological quality of water. Routine bacteriological monitoring as recommended in the ODWOs is carried out by the operating authority. Water from the Kingston Water Treatment Plant, in terms of the limited DWSP bacteriological examination, was of good quality.

Inorganic and Physical Parameters

Laboratory and Field Chemistry

The results for Laboratory and Field Chemistry scans were below any applicable health related ODWOs .

There are ODWOs that are set for parameters which are related to aesthetic quality rather than health; one of these is Organic Nitrogen. Organic Nitrogen is calculated by subtracting the value for Ammonia (Ammonium Total) from the value for Total Kjeldahl Nitrogen (Nitrogen Tot Kjeld). The aesthetic ODWO of 0.15 mg/L was exceeded in many of the treated water samples and distribution system water samples. When Organic Nitrogen exceeds 0.15 mg/L in treated water some taste and odour problems can result.

This guideline is exceeded in most supplies. Based on the information obtained from the DWSP, which generally indicates no problems with this parameter exceedence, the guideline may be modified when the ODWOs are reviewed.

The aesthetic ODWO of 5.0 True Colour Units (TCU) was excceded in the March distribution system Site 2 free flow water sample

with a value of 7.0 TCU. Colour in drinking water may be due to the presence of natural or synthetic organic substances as well as certain metallic ions.

It is desirable that the Temperature of drinking water be less than 15°C; the palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The desired ODWO was exceeded eleven times in the treated water and the free flow distribution waters.

Metals

The results reported for the Metal scan were below any applicable health related ODWOs.

Elevated levels of Copper, Lead and Zinc were generally detected in the standing samples from the distribution system as compared to the free flow samples thus, indicating that small quantities of these metals were leached from the household plumbing as the water stood overnight.

At present, there is no evidence that Aluminum is physiologically harmful and no health limit has been specified. The measure of residual Aluminum in the treated water is important to indicate efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 0.1 mg/L as Al in the water leaving the plant. Aluminum values exceeded the ODWO

operational guideline seven times in the treated waters.

Organic Parameters

Chloroaromatics

Results of the Chloroaromatics scan showed nine parameters were detected:

Hexachlorobutadiene
1,2,3-Trichlorobenzene
1,2,3,5-Tetrachlorobenzene
1,2,4-Trichlorobezene
1,3,5-Trichlorobenzene
Hexachloroethane
Pentachlorobenzene
2,3,6-Trichlorotoluene
2,4,5-Trichlorotoluene

Hexachlorobutadiene was detected at trace levels, twice in the distribution system Site 2 water.

1,2,3-Trichlorobenzene was detected at a trace level, once in the treated water.

1,2,3,5-Tetrachlorobenzene was detected at trace levels, once in the distribution system Site 1 water and Site 2 water.

1,2,4-Trichlorobenzene was detected at trace levels, once in the raw water and once in the distribution system Site 1 water.

1,3,5- Trichlorobenzene was detected at trace levels, once in the treated water and once in the distribution system Site 1 water.

Hexachloroethane was detected at trace levels, twice in the treated water, twice in the distribution system Site 1 water and twice in the Site 2 water. Both the May distribution system Site 1 water sample and the March Site 2 water sample had value of 12.0 ng/L; this is far below the United States Environmental Protection Agency (EPA) Ambient Water Quality (AWQ) guideline of 1900 ng/L. AWQ guidelines are designed to ensure that surface water, used as a drinking water source and from which fish are consumed, does not contain substances at levels that would be hazardous to human health. Since both water and fish consumption are considered, AWQ guidelines are usually more stringent than corresponding drinking water guidelines.

Pentachlorobenzene was detected at a trace level, once in the distribution sytem Site 2 water.

2,3,6-Trichlorotoluene was detected at trace levels, once at distribution system Site 1 and once at Site 2.

2,4,5-Trichlorotoluene was detected at trace levels, once at distribution system Site 1 and once at Site 2.

Review of these results, along with information from other water supplies on DWSP, would indicate that certain Chloroaromatics

appear more frequently in the treated water than in the raw and almost always only at trace levels. These occurrences could possibly be due to a reaction of chlorine with organics present in the water or in the distribution system.

Chlorophenols

Results of the Chlorophenol scan showed that no Chlorophenols were detected.

Pesticides and PCB (Polychlorinated Biphenyl)

Results of the Pesticide and PCB scan showed that two pesticides were detected:

Alpha BHC

Lindane

Lindane consists of several isomers of BHC (Benzene Hexachloride). Alpha BHC is the isomer most predominant in the Great Lakes basin as indicated in results from other water supplies on DWSP.

Alpha BHC was detected at trace levels, ten times in the raw water, nine times in the treated water and eight times in both the distribution system waters.

Lindane was detected at trace levels, once in the raw water, twice in the treated water, the distribution system Site 1 water and the Site 2 water.

Specific Pesticides

Results of the Specific Pesticide scan showed that one parameter was detected:

Atrazine

Atrazine was detected at a trace level, once in the distribution system Site 1 water.

Phenolics

Phenolics were detected at trace levels, four times in the raw water, five times in the treated water and once in both the distribution system Site 1 water and Site 2 water. The May raw and treated waters had values of 38.6 ug/L and 46 ug/L. These values are above the Maximum Desirable Concentration of 2 ug/L. This limit has been set primarily to prevent the occurrence of undesirable tastes and odours, particularly in chlorinated waters. Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes.

Polynuclear Aromatic Hydrocarbons (PAH)

Results of the PAH scan show that no PAHs were detected.

Volatiles

The results of the Volatile scan showed that three parameters other than Trihalomethanes (THMs) were detected:

Toluene

Ethylbenzene

Para and Meta-Xylene

Toluene was detected at trace levels, once in the raw water, twice in the treated water and the distribution system Site 1 water and once in the Site 2 water.

Ethylbenzene was detected at trace levels, twice in the raw and treated water, and once in the distribution system Site 1 water.

Para and Meta-Xylene are measured as one compound (M-Xylene) and were detected at trace levels, once in the treated water and once in the distribution system Site 1 water.

These volatiles are typically found on an occasional basis at other water supplies included on the DWSP usually at trace levels.

THMs are known to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised mainly of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Chlorodibromomethane, Dichlorobromomethane and Total THMs were detected in all treated waters. Bromoform was detected at trace levels, three times in the treated water, twice in the distribution system Site 1 water and Site 2 water. All THM occurrences were well below the ODWO of 350 ug/L for Total THMs.

THMs were detected at trace levels in the May and June raw water samples indicating the presence of small amounts of chlorine.

Comparison with the results from the DWSP in 1986 shows that the raw and treated water quality from 1986 to 1987 has remained consistent.

CONCLUSIONS

The Kingston Water Treatment Plant for the sample year of 1987 produced good quality water at the plant and this was maintained throughout the distribution system.

No health related guidelines, for organic or inorganic parameters, were exceeded during 1986 and 1987.

RECOMMENDATIONS

Two recommendations can be made:

1) The data base should be reviewed in consultation with Regional, Plant and DWSP personnel to determine if sampling location, sampling frequency and the number of parameters analysed should be revised to allow for a more efficient characterization of the water.

2) Low levels of THMs were detected in two raw water samples; the sampling site for the raw water should be reassessed and

possibly retrofitted to ensure that it still meets the DWSP sampling protocol.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

	SAMPLE DAY CONDITIONS		TREATMENT CHEMICAL DOSAGES (MG/L)		
			PRE-CHLORINATION	COAGULATION	DECHLORINATION
			CHLORINE	ALUM LIQUID	SULPHUR DIOXIDE
DATE	RETENTION TIME(HRS)	FLOW (1000 M3)			
JAN 05	6.7	53.5	1.60	9.30	.15
FEB 02	6.3	59.5	1.20	8.40	.07
MAR 02	6.9	52.5	1.80	10.70	.06
APR 06	7.5	49.0	1.50	9.90	.05
MAY 11	6.2	60.0	1.50	9.60	.12
JUN 01	6.3	50.5	1.60	.	.19
JUL 06	6.0	60.5	1.70	9.50	.06
AUG 04	7.5	47.0	1.70	9.60	.08
SEP 08	7.7	48.0	1.80	7.70	.17
OCT 05	5.5	64.0	1.50	7.10	.25
NOV 03	5.5	67.0	1.50	8.30	.19
DEC 08	6.9	52.0	1.30	8.40	.11

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
BACTERIOLOGICAL	AEROMONAS SP	0	0	0	1	0	0	0	0	0	0	0	0
	COLIFORM	0	0	0	1	0	0	0	0	0	0	0	0
	ESCHERICHIA COLI BY PRESENCE/ABSENCE	0	0	0	1	0	0	0	0	0	0	0	0
	FECAL COLIFORM	0	0	0	1	0	0	0	0	0	0	0	0
	FECAL COLIFORM MEMBRANE FILTRATION	12	7	0	0	0	0	0	0	0	0	0	0
	P/A BOTTLE	0	0	0	12	1	0	12	0	0	12	0	0
	STANDARD PLATE COUNT MEMBRANE FILT.	12	12	0	12	9	0	10	8	0	11	10	0
	STAPH AUREUS	0	0	0	1	0	0	0	0	0	0	0	0
	TOTAL COLIFORM BACKGROUND MF	12	12	0	12	0	0	12	6	0	12	3	0
	TOTAL COLIFORM MEMBRANE FILTRATION	12	10	0	12	0	0	12	1	0	12	0	0
*TOTAL SCAN BACTERIOLOGICAL		48	41	0	53	10	0	46	15	0	47	13	0
*TOTAL GROUP BACTERIOLOGICAL		48	41	0	53	10	0	46	15	0	47	13	0
CHEMISTRY (FLD)	FIELD COMBINED CHLORINE RESIDUAL	0	0	0	12	12	0	16	16	0	15	15	0
	FIELD FREE CHLORINE RESIDUAL	0	0	0	12	12	0	5	5	0	2	2	0
	FIELD PH	12	12	0	12	12	0	24	24	0	24	24	0
	FIELD TEMPERATURE	12	12	0	12	12	0	20	20	0	24	24	0
	FIELD TOTAL CHLORINE RESIDUAL	0	0	0	12	12	0	18	18	0	15	15	0
	FIELD TURBIDITY	12	12	0	12	12	0	7	7	0	8	8	0
*TOTAL SCAN CHEMISTRY (FLD)		36	36	0	72	72	0	90	90	0	88	88	0
CHEMISTRY (LAB)	ALKALINITY	12	12	0	11	11	0	24	24	0	24	24	0
	AMMONIUM TOTAL	12	7	4	11	2	8	23	4	17	24	11	11

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER # ANALYSED	RAW WATER POSITIVE	RAW WATER TRACE	TREATED WATER # ANALYSED	TREATED WATER POSITIVE	TREATED WATER TRACE	SITE 1 # ANALYSED	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 # ANALYSED	SITE 2 POSITIVE	SITE 2 TRACE
CHEMISTRY (LAB)	CALCIUM	12	12	0	11	11	0	23	23	0	24	24	0
	CHLORIDE	12	12	0	11	11	0	23	23	0	24	24	0
	COLOUR	12	8	4	12	0	11	23	20	2	24	8	15
	CONDUCTIVITY	12	12	0	11	11	0	24	24	0	24	24	0
	CYANIDE	9	0	0	9	0	0	9	0	0	9	0	0
	FLUORIDE	12	12	0	11	11	0	23	23	0	24	24	0
	HARDNESS	12	12	0	11	11	0	23	23	0	24	24	0
	MAGNESIUM	12	12	0	11	11	0	23	23	0	24	24	0
	NITRITE	12	3	8	11	1	8	23	0	19	24	2	15
	NITROGEN TOTAL KJELDAHL	12	11	0	11	6	4	24	19	5	24	23	1
	PH	12	12	0	11	11	0	24	24	0	24	24	0
	PHOSPHORUS FIL REACT	12	11	1	11	0	7	0	0	0	0	0	0
	PHOSPHORUS TOTAL	12	10	2	11	2	6	0	0	0	0	0	0
	SODIUM	12	12	0	11	11	0	23	23	0	24	24	0
	TOTAL NITRATES	12	10	2	10	9	1	22	20	2	24	20	2
	TOTAL SOLIDS	12	12	0	12	12	0	24	24	0	24	24	0
	TURBIDITY	12	12	0	11	11	0	23	23	0	24	24	0
*TOTAL SCAN CHEMISTRY (LAB)		225	192	21	208	142	45	381	320	45	393	328	44
METALS	ALUMINUM	12	10	0	12	12	0	23	23	0	24	24	0
	ARSENIC	12	0	0	12	0	0	23	0	0	24	0	0
	BARIUM	12	12	0	12	12	0	23	23	0	24	24	0
	BERYLLIUM	12	0	0	12	0	0	23	0	0	24	0	0
	BORON	12	6	5	12	6	6	24	10	14	24	8	14
	CADMIUM	12	0	0	12	0	0	23	1	0	24	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
METALS	CHROMIUM	12	5	0	12	4	0	23	5	0	24	9	0
	COBALT	12	2	0	12	1	0	23	1	0	24	0	0
	COPPER	12	12	0	12	10	0	23	23	0	24	23	0
	CYANIDE	3	0	0	3	0	0	3	0	0	3	0	0
	IRON	12	10	0	12	1	0	23	23	0	24	24	0
	LEAD	12	3	0	12	1	0	23	11	0	24	3	0
	MANGANESE	12	12	0	12	2	0	23	23	0	24	24	0
	MERCURY	12	11	0	12	12	0	12	7	0	12	4	0
	MOLYBDENUM	12	10	0	12	10	0	23	2	0	24	13	0
	NICKEL	12	3	0	12	5	0	23	7	0	24	9	0
	SELENIUM	12	0	0	12	0	0	23	0	0	24	0	0
	STRONTIUM	12	12	0	12	12	0	23	23	0	24	24	0
	URANIUM	12	12	0	12	12	0	24	22	2	24	22	2
	VANADIUM	12	0	0	12	0	0	23	0	0	24	0	0
	ZINC	12	8	0	12	6	0	23	19	0	24	19	0
*TOTAL SCAN METALS		243	128	5	243	106	6	454	223	16	471	230	16
*TOTAL GROUP INORGANIC & PHYSICAL		504	356	26	523	320	51	925	633	61	952	646	60
CHLOROAROMATICS	123 TRICHLOROBENZENE	12	0	0	12	0	1	11	0	0	10	0	0
	1234 TETRACHLOROBENZENE	12	0	0	12	0	0	11	0	0	10	0	0
	1235 TETRACHLOROBENZENE	12	0	0	12	0	0	11	0	1	10	0	1
	124 TRICHLOROBENZENE	12	0	1	12	0	0	11	0	1	10	0	0
	1245 TETRACHLOROBENZENE	12	0	0	12	0	0	11	0	0	10	0	0
	135 TRICHLOROBENZENE	12	0	0	12	0	1	11	0	1	10	0	0
	236 TRICHLOROTOLUENE	12	0	0	12	0	0	11	0	1	10	0	1

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER # ANALYSED	RAW WATER POSITIVE	RAW WATER TRACE	TREATED WATER # ANALYSED	TREATED WATER POSITIVE	TREATED WATER TRACE	SITE 1 # ANALYSED	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 # ANALYSED	SITE 2 POSITIVE	SITE 2 TRACE
CHLOROAROMATICS	245 TRICHLOROTOLUENE	12	0	0	12	0	0	11	0	1	10	0	1
	26A TRICHLOROTOLUENE	12	0	0	12	0	0	11	0	0	10	0	0
	HEXACHLOROBUTADIENE	12	0	0	12	0	0	11	0	0	10	0	2
	HEXACHLOROETHANE	12	0	0	12	0	2	11	1	2	10	1	2
	OCTACHLOROSTYRENE	12	0	0	12	0	0	11	0	0	10	0	0
	PENTACHLOROBENZENE	12	0	0	12	0	0	11	0	0	10	0	1
*TOTAL SCAN CHLOROAROMATICS		156	0	1	156	0	4	143	1	7	130	1	8
CHLOROPHENOLS	234 TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	2345 TETRACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	2356 TETRACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	245-TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	246-TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	PENTACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
*TOTAL SCAN CHLOROPHENOLS		12	0	0	12	0	0	0	0	0	0	0	0
PAH	ANTHANTHRENE	0	0	0	0	0	0	0	0	0	0	0	0
	ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(A) ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO (A) PYRENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(B) CHRYSENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(B) FLUORANTHENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(E)PYRENE	3	0	0	3	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
PAH	BENZO(G,H,I) PERYLENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(J) FLUORANTHENE	0	0	0	0	0	0	0	0	0	0	0	0
	BENZO(K) FLUORANTHENE	3	0	0	3	0	0	0	0	0	0	0	0
	CHRYSENE	3	0	0	3	0	0	0	0	0	0	0	0
	CORONENE	3	0	0	3	0	0	0	0	0	0	0	0
	DIBENZO(A,H) ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	DIMETHYL BENZO(A) ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	FLUORANTHENE	3	0	0	3	0	0	0	0	0	0	0	0
	INDENO(1,2,3-C,D) PYRENE	3	0	0	3	0	0	0	0	0	0	0	0
	PERYLENE	3	0	0	3	0	0	0	0	0	0	0	0
	PHENANTHRENE	3	0	0	3	0	0	0	0	0	0	0	0
	PYRENE	3	0	0	3	0	0	0	0	0	0	0	0
*TOTAL SCAN PAH		51	0	0	51	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALACHLOR	12	0	0	12	0	0	11	0	0	11	0	0
	ALDRIN	12	0	0	12	0	0	11	0	0	10	0	0
	ALPHA BHC	12	0	9	12	0	9	11	0	8	10	0	8
	ALPHA CHLORDANE	12	0	0	12	0	0	11	0	0	10	0	0
	ATRATONE	12	0	0	12	0	0	11	0	0	11	0	0
	BETA BHC	12	0	0	12	0	0	11	0	0	10	0	0
	DIELDRIN	12	0	0	12	0	0	11	0	0	10	0	0
	ENDRIN	12	0	0	12	0	0	11	0	0	10	0	0
	ETHLYENE DIBROMIDE	9	0	0	9	0	0	9	0	0	9	0	0
	GAMMA CHLORDANE	12	0	0	12	0	0	11	0	0	10	0	0
	HEPTACHLOR	12	0	0	12	0	0	11	0	0	10	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
PESTICIDES & PCB	HEPTACHLOR EPOXIDE	12	0	0	12	0	0	11	0	0	10	0	0
	HEXACHLOROBENZENE	12	0	0	12	0	0	11	0	0	10	0	0
	LINDANE	12	0	1	12	0	2	11	0	2	10	0	2
	METHOXYCHLOR	12	0	0	12	0	0	11	0	0	10	0	0
	MIREX	12	0	0	12	0	0	11	0	0	10	0	0
	O,P-DDT	12	0	0	12	0	0	11	0	0	10	0	0
	OXYCHLORDANE	12	0	0	12	0	0	11	0	0	10	0	0
	PCB	12	0	0	12	0	0	11	0	0	10	0	0
	PP-DDD	12	0	0	12	0	0	11	0	0	10	0	0
	PPDDE	12	0	0	12	0	0	11	0	0	10	0	0
	PPDDT	12	0	0	12	0	0	11	0	0	10	0	0
	THIODAN I	12	0	0	12	0	0	11	0	0	10	0	0
	THIODAN II	12	0	0	12	0	0	11	0	0	10	0	0
	THIODAN SULPHATE	12	0	0	12	0	0	11	0	0	10	0	0
*TOTAL SCAN PESTICIDES & PCB		297	0	10	297	0	11	273	0	10	251	0	10
PHENOLICS		12	1	4	12	1	5	1	0	1	1	0	1
*TOTAL SCAN PHENOLICS		12	1	4	12	1	5	1	0	1	1	0	1
SPECIFIC PESTICIDES		2	0	0	2	0	0	0	0	0	0	0	0
	2,4 D PROPIONIC ACID	2	0	0	2	0	0	0	0	0	0	0	0
	2,4,5-T	2	0	0	2	0	0	0	0	0	0	0	0
	2,4-D	2	0	0	2	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
SPECIFIC PESTICIDES	24-DICHLORORPHENOXYBUTYRIC	2	0	0	2	0	0	0	0	0	0	0	0
	AMETRYNE	12	0	0	12	0	0	11	0	0	11	0	0
	AMINOCARB	0	0	0	0	0	0	0	0	0	0	0	0
	ATRAZINE	12	0	0	12	0	0	11	0	1	11	0	0
	BENOMYL	0	0	0	0	0	0	0	0	0	0	0	0
	BLADEX	12	0	0	12	0	0	11	0	0	11	0	0
	BUX (METALKAMATE)	2	0	0	2	0	0	0	0	0	0	0	0
	CARBOFURAN	2	0	0	2	0	0	0	0	0	0	0	0
	DIALLATE	2	0	0	2	0	0	0	0	0	0	0	0
	DIAZINON	2	0	0	2	0	0	0	0	0	0	0	0
	DICAMBA	2	0	0	2	0	0	0	0	0	0	0	0
	DICHLOROVOS	2	0	0	2	0	0	0	0	0	0	0	0
	DURSBAN	2	0	0	2	0	0	0	0	0	0	0	0
	EPTAM	2	0	0	2	0	0	0	0	0	0	0	0
	ETHION	2	0	0	2	0	0	0	0	0	0	0	0
	GUTHION	0	0	0	0	0	0	0	0	0	0	0	0
	IPC	2	0	0	2	0	0	0	0	0	0	0	0
	MALATHION	2	0	0	2	0	0	0	0	0	0	0	0
	METHYL PARATHION	2	0	0	2	0	0	0	0	0	0	0	0
	METHYLTRITHION	2	0	0	2	0	0	0	0	0	0	0	0
	METOLACHLOR	12	0	0	12	0	0	11	0	0	11	0	0
	MEVINPHOS	2	0	0	2	0	0	0	0	0	0	0	0
	PARATHION	2	0	0	2	0	0	0	0	0	0	0	0
	PHORATE (THIMET)	2	0	0	2	0	0	0	0	0	0	0	0
	PICHLORAM	0	0	0	0	0	0	0	0	0	0	0	0
	PROMETONE	12	0	0	12	0	0	11	0	0	11	0	0
	PROMETRYNE	12	0	0	12	0	0	11	0	0	11	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER # ANALYSED	RAW WATER POSITIVE	RAW WATER TRACE	TREATED WATER # ANALYSED	TREATED WATER POSITIVE	TREATED WATER TRACE	SITE 1 # ANALYSED	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 # ANALYSED	SITE 2 POSITIVE	SITE 2 TRACE
SPECIFIC PESTICIDES	PROPAZINE	12	0	0	12	0	0	11	0	0	11	0	0
	PROPOXUR	2	0	0	2	0	0	0	0	0	0	0	0
	RELDAN	2	0	0	2	0	0	0	0	0	0	0	0
	ROMNEL	2	0	0	2	0	0	0	0	0	0	0	0
	SENCOR	12	0	0	12	0	0	11	0	0	11	0	0
	SEVIN (CARBARYL)	2	0	0	2	0	0	0	0	0	0	0	0
	SILVEX	2	0	0	2	0	0	0	0	0	0	0	0
	SIMAZINE	12	0	0	12	0	0	11	0	0	11	0	0
	SUTAN (BUTYLATE)	2	0	0	2	0	0	0	0	0	0	0	0
	TOXAPHENE	0	0	0	0	0	0	0	0	0	0	0	0
*TOTAL SCAN SPECIFIC PESTICIDES		162	0	0	162	0	0	99	0	1	99	0	0
VOLATILES	1,1 DICHLOROETHANE	12	0	0	12	0	0	12	0	0	12	0	0
	1,1 DICHLOROETHYLENE	12	0	0	12	0	0	12	0	0	12	0	0
	1,2 DICHLOROBENZENE	12	0	0	12	0	0	12	0	0	12	0	0
	1,2 DICHLOROETHANE	12	0	0	12	0	0	12	0	0	12	0	0
	1,2 DICHLOROPROPANE	12	0	0	12	0	0	12	0	0	12	0	0
	1,3 DICHLOROBENZENE	12	0	0	12	0	0	12	0	0	12	0	0
	1,4 DICHLOROBENZENE	12	0	0	12	0	0	12	0	0	12	0	0
	111, TRICHLOROETHANE	12	0	0	12	0	0	12	0	0	12	0	0
	112 TRICHLOROETHANE	12	0	0	12	0	0	12	0	0	12	0	0
	1122 TETRA-CHLOROETHANE	12	0	0	12	0	0	12	0	0	12	0	0
	BENZENE	12	0	0	12	0	0	12	0	0	12	0	0
	BROMOFORM	12	0	0	12	0	3	12	0	2	12	0	2
	CARBON TETRACHLORIDE	12	0	0	12	0	0	12	0	0	12	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER			TREATED WATER			SITE 1			SITE 2		
		# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
VOLATILES	CHLOROBENZENE	12	0	0	12	0	0	12	0	0	12	0	0
	CHLORODIBROMOMETHANE	12	0	0	12	12	0	12	12	0	12	12	0
	CHLOROFORM	12	1	1	12	12	0	12	12	0	12	12	0
	DICHLOROBROMOMETHANE	12	0	0	12	12	0	12	12	0	12	12	0
	ETHLYENE DIBROMIDE	3	0	0	3	0	0	3	0	0	3	0	0
	ETHYLBENZENE	12	0	2	12	0	2	12	0	1	12	0	0
	M-XYLENE	12	0	0	12	0	1	12	0	1	12	0	0
	METHYLENE CHLORIDE	12	0	0	11	0	0	10	0	0	11	0	0
	O-XYLENE	12	0	0	12	0	0	12	0	0	12	0	0
	P-XYLENE	12	0	0	12	0	0	12	0	0	12	0	0
	TETRACHLOROETHYLENE	12	0	0	12	0	0	12	0	0	12	0	0
	TOLUENE	12	0	1	12	0	2	12	0	2	12	0	1
	TOTAL TRIHALOMETHANES	12	2	0	12	12	0	12	12	0	12	12	0
	TRANS 1,2 DICHLOROETHYLENE	12	0	0	12	0	0	12	0	0	12	0	0
	TRICHLOROETHYLENE	12	0	0	12	0	0	12	0	0	12	0	0
	TRIFLUOROCHLOROTOLUENE	12	0	0	12	0	0	12	0	0	12	0	0
*TOTAL SCAN VOLATILES		339	3	4	338	48	8	337	48	6	338	48	3
*TOTAL GROUP ORGANIC		1029	4	19	1028	49	28	853	49	25	819	49	22
TOTAL		1581	401	45	1604	379	79	1824	697	86	1818	708	82

KEY TO TABLES 5 AND 6

A ONTARIO DRINKING WATER OBJECTIVES
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
1*. MAC for Bacteriological Analyses
Poor water quality is indicated when :
- total coliform counts > 0 < 5
- P/A Bottle Test is present after 48 hours
- Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
- Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
- Standard Plate Count should not exceed 500 organisms per ml at 35 deg C within 48 hours

2. Interim Maximum Acceptable Concentration (IMAC)
3. Maximum Desirable Concentration (MDC)
4. Aesthetic or Recommended Operational Guideline
- hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness >200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.

B HEALTH & WELFARE CANADA
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC

C WORLD HEALTH ORGANIZATION
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

H USSR MAXIMUM PERMISSIBLE CONCENTRATION

I NEW YORK STATE AMBIENT WATER GUIDELINE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!AW	No Data: Analysis Withdrawn
!CR	No Data: Could Not Confirm By Reanalysis
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample

RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
AERONONAS SP (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE = 0	(A1)	
APR	.	0	.	.	.	.
E. COLI (P/A) (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE =		
APR	.	0	.	.	.	.
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0	(A1)	
JAN	0	.	.	.	.	.
FEB	0	.	.	.	.	.
MAR	3	.	.	.	.	.
APR	1	.	.	.	.	.
MAY	0	.	.	.	.	.
JUN	2	.	.	.	.	.
JUL	0	.	.	.	.	.
AUG	0	.	.	.	.	.
SEP	2	.	.	.	.	.
OCT	1	.	.	.	.	.
NOV	1	.	.	.	.	.
DEC	1	.	.	.	.	.
FECAL COLIFORM (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE = 0	(A1)	
APR	.	0	.	.	.	.
STANDRD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML	(A1)	
JAN	16	86	.	1	.	1
FEB	4	0	.	3	.	1
MAR	104	2	.	0	.	0
APR	25	16	.	14	.	10
MAY	2400 >	0	.	0	.	1
JUN	230	3	.	36	.	13
JUL	190	1	.	58	.	10
AUG	2400 >	4	.	!AW	.	!AW
SEP	120	15	.	!AW	.	137
OCT	73	0	.	67	.	8
NOV	30	3	.	5	.	4
DEC	90	1	.	1	.	2
P/A BOTTLE (0=ABSENT)		DET'N LIMIT = 0		GUIDELINE = 0	(A1*)	
JAN	.	0	.	0	.	0
FEB	.	0	.	0	.	0
MAR	.	0	.	0	.	0

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.	1	.	0	.	0
MAY	.	0	.	0	.	0
JUN	.	0	.	0	.	0
JUL	.	0	.	0	.	0
AUG	.	0	.	0	.	0
SEP	.	0	.	0	.	0
OCT	.	0	.	0	.	0
NOV	.	0	.	0	.	0
DEC	.	0	.	0	.	0
STAPH AUREUS (0=ABSENT)			DET'N LIMIT = N/A	GUIDELINE = 0 (A1)		
APR	.	0	.	.	.	.
COLIFORM (0=ABSENT)			DET'N LIMIT = N/A	GUIDELINE = 0 (A1)		
APR	.	0	.	.	.	.
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
JAN	1	0	.	0	.	0
FEB	BDL	0	.	0	.	0
MAR	60	0	.	0	.	0
APR	6	0	.	0	.	0
MAY	0	0	.	0	.	0
JUN	56 A3C	0	.	0	.	0
JUL	54 A3C	0	.	0	.	0
AUG	16 A3C	0	.	0	.	0
SEP	24	0	.	9 A3C	.	0
OCT	38	0	.	0	.	0
NOV	4 A3C	0	.	0	.	0
DEC	77 A3C	0	.	0	.	0
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	4	0	.	0	.	0
FEB	28	0	.	0	.	0
MAR	113	0	.	0	.	0
APR	96	0	.	0	.	1
MAY	1600	0	.	1	.	0
JUN	390	0	.	1	.	0
JUL	2500	0	.	3	.	0
AUG	2300	0	.	5	.	0
SEP	162	0	.	1160	.	2400 >
OCT	188	0	.	0	.	0
NOV	370	0	.	0	.	0
DEC	420	0	.	1	.	1

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			**DET'N LIMIT = N/A**	**GUIDELINE =**	**N/A**	
JAN	.	.140	.	.100	.	.100
FEB	.	.150	.100	.100	.	.100
MAR	.	.190	.100	.100	.	.100
APR	.	.140	.100	.100	.100	.100
MAY	.	.130	.	.100	.	.100
JUN	.	.160	.100	.100	.	.100
JUL	.	.150	.	.100	.	.100
AUG	.	.160	.	.	.	.100
SEP	.	.140	.	.100	.	.100
OCT	.	.180	.100	.050	.	.100
NOV	.	.140	.	.100	.100	.100
DEC	.	.140	.	.200	.100	.100
FLD CHLORINE FREE (MG/L)			**DET'N LIMIT = N/A**	**GUIDELINE =**	**N/A**	
JAN	.	.290	.	.	.	.
FEB	.	.420	.	.	.	.
MAR	.	.360	.	.100	.	.100
APR	.	.320	.100	.100	.	.
MAY	.	.390	.	.	.	.
JUN	.	.270	.	.	.	.
JUL	.	.450	.	.	.	.
AUG	.	.420	.	.100	.	.
SEP	.	.320	.	.	.	.
OCT	.	.320	.	.100	.	.
NOV	.	.310	.	.	.	.100
DEC	.	.360	.	.	.	.
TOTAL CHLORINE (MG/L)			**DET'N LIMIT = N/A**	**GUIDELINE =**	**N/A**	
JAN	.	.430	.	.100	.	.100
FEB	.	.570	.100	.100	.	.100
MAR	.	.550	.200	.200	.	.200
APR	.	.480	.100	.200	.100	.100
MAY	.	.520	.	.100	.	.100
JUN	.	.430	.100	.100	.	.100
JUL	.	.600	.	.100	.	.100
AUG	.	.580	.	.100	.	.100
SEP	.	.460	.040	.100	.	.100
OCT	.	.500	.100	.150	.	.100
NOV	.	.450	.	.100	.100	.100
DEC	.	.500	.	.200	.100	.100
FLD PH (DMSNLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = 6.5-8.5 (A4)**		
JAN	7.800	7.500	7.200	7.600	7.200	7.600

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	7.750	7.500	7.600	7.600	7.600	7.800
MAR	7.400	7.400	7.400	7.400	7.600	7.600
APR	7.900	7.500	7.600	7.400	7.600	7.600
MAY	7.950	7.600	7.800	7.800	7.800	7.800
JUN	7.800	7.550	7.800	7.800	7.800	7.800
JUL	7.500	7.300	7.400	7.400	7.600	7.600
AUG	7.900	7.900	7.400	7.400	7.600	7.600
SEP	8.000	7.500	7.400	7.400	7.600	7.600
OCT	7.800	7.500	7.500	7.600	7.800	7.800
NOV	7.800	7.700	7.600	7.800	7.800	7.600
DEC	7.900	7.700	7.600	7.600	7.600	7.600
TEMPERATURE (DEG.C)			DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	2.300	3.000	10.000	8.500	10.000	8.500
FEB	.200	1.000	9.000	7.000	9.000	7.500
MAR	.200	.500	9.000	6.000	9.000	6.000
APR	2.000	2.200	.	.	10.000	7.500
MAY	6.900	7.000	12.500	10.000	13.000	10.500
JUN	9.800	12.000	16.000	13.000	15.000	12.500
JUL	16.000	17.000	17.000	17.000	17.500	16.000
AUG	18.000	21.000	19.000	18.000	19.000	18.000
SEP	18.000	19.000	19.000	18.000	19.000	18.500
OCT	14.000	15.000	17.500	17.000	7.500	17.000
NOV	11.000	12.000	.	.	16.000	15.000
DEC	5.000	5.500	12.000	9.500	12.500	10.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)	
JAN	.750	.100	.	.	.	.
FEB	.850	.070	.	.	.	.
MAR	.800	.160	.	.	.	.
APR	1.200	.080	.	.	.	.
MAY	.650	.070	.090	.090	.090	.080
JUN	.450	.080	.	.	.	.
JUL	.650	.060	.090	.070	.090	.070
AUG	1.300	.070	.	.	.	.
SEP	.600	.080	.	.	.	.
OCT	.580	.080	.090	.	.090	.080
NOV	.500	.090	.	.	.	.
DEC	.750	.080	.100	.800	.100	.080

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = .200		GUIDELINE = 30-500 (A4)	
JAN	111.800	94.100	95.500	94.400	96.500	94.800
FEB	111.700	95.900	92.900	92.400	93.000	93.100
MAR	118.700	99.000	98.800	99.000	98.600	100.100
APR	131.800	94.400	94.900	97.900	94.900	94.800
MAY	108.500	92.900	94.100	93.400	93.800	93.400
JUN	102.800	92.900	101.600	97.700	99.100	99.500
JUL	116.800	98.400	98.100	99.000	97.900	98.300
AUG	108.400	93.100	90.400	89.400	95.300	95.200
SEP	108.400	88.600	94.300	92.600	90.500	90.000
OCT	114.200	91.700	92.100	92.400	92.400	92.800
NOV	124.400	ISM	92.000	95.100	92.500	92.100
DEC	141.400	91.200	91.800	90.600	92.600	92.700
CALCIUM (MG/L)			DET'N LIMIT = .100		GUIDELINE = 100. (F2)	
JAN	42.200	38.600	39.000	37.200	37.800	38.500
FEB	44.500	39.900	41.200	39.900	39.700	39.800
MAR	49.000	42.000	42.100	43.600	42.300	42.200
APR	51.000	40.200	41.000	41.900	40.700	40.500
MAY	45.600	40.000	40.800	39.200	39.000	40.200
JUN	40.200	38.000	39.800	39.600	39.600	39.400
JUL	45.200	40.800	42.200	41.800	42.200	41.600
AUG	43.600	39.800	38.600	38.000	38.800	39.000
SEP	45.400	38.800	42.000	41.800	40.000	38.000
OCT	44.400	38.000	38.400	38.000	38.200	38.600
NOV	49.000	ISM	39.200	39.400	39.400	38.600
DEC	55.400	40.000	39.600	IIS	38.200	38.800
CHLORIDE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 250.0 (A3)	
JAN	22.500	22.500	22.500	22.500	22.000	22.500
FEB	24.000	25.000	25.000	24.500	25.000	24.500
MAR	20.500	21.500	22.000	22.000	22.000	21.500
APR	24.000	24.500	22.500	23.000	23.000	23.500
MAY	23.500	24.000	24.000	24.000	24.500	24.000
JUN	23.000	24.000	24.500	24.000	24.000	23.500
JUL	22.500	24.000	23.500	24.000	24.000	23.500
AUG	22.500	24.000	24.500	24.000	24.000	24.000
SEP	23.500	24.500	25.000	24.500	24.500	24.500
OCT	23.500	24.000	24.000	24.000	24.000	24.000
NOV	24.000	ISM	23.700	23.700	24.000	23.700
DEC	24.900	23.600	23.800	IIS	23.800	23.900
COLOUR (TCU)			DET'N LIMIT = .5		GUIDELINE = 5.0 (A3)	
JAN	3.000	2.000 <T	4.000	4.500	2.500 <T	2.500 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	3.000	1.000 <T	3.500	3.500	2.500 <T	2.000 <T
MAR	6.500	2.500 <T	4.500	2.000 <T	3.500	7.000
APR	4.000	1.500 <T	3.000	4.000	3.000	2.500 <T
MAY	3.000	BDL	BDL	3.500	2.000 <T	2.500 <T
JUN	1.000 <T	1.000 <T	1.000 <T	3.000	3.000	2.000 <T
JUL	3.000	1.000 <T	3.500	4.000	2.000 <T	2.500
AUG	2.500	1.000 <T	3.000	3.000	2.000 <T	2.000 <T
SEP	2.000 <T	.500 <T	3.500	4.000	3.000	BDL
OCT	1.500 <T	1.000 <T	3.500	4.500	2.000 <T	2.500
NOV	1.500 <T	1.500 <T	2.500	3.000	1.500 <T	1.500 <T
DEC	2.500	1.000 <T	3.000	IIS	2.000 <T	2.500
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1		GUIDELINE = 400. (F2)	
JAN	342	323	323	324	321	315
FEB	352	325	329	327	330	327
MAR	338	314	315	316	315	317
APR	392	329	329	329	330	331
MAY	349	327	320	319	320	320
JUN	338	331	346	345	346	347
JUL	355	333	333	334	333	332
AUG	333	318	318	316	325	326
SEP	337	315	325	321	317	315
OCT	349	319	318	319	317	318
NOV	370	ISH	318	318	320	319
DEC	408	319	320	315	321	321
FLUORIDE (MG/L)			DET'N LIMIT = .01		GUIDELINE = 2.400 (A1)	
JAN	.140	.130	.120	.120	.120	.120
FEB	.150	.120	.130	.140	.130	.130
MAR	.140	.120	.130	.120	.120	.110
APR	.120	.100	.120	.100	.110	.100
MAY	.150	.120	.130	.130	.120	.130
JUN	.120	.090	.120	.120	.100	.100
JUL	.150	.100	.100	.100	.120	.110
AUG	.180	.150	.150	.150	.150	.150
SEP	.140	.120	.100	.100	.120	.120
OCT	.140	.120	.120	.120	.120	.120
NOV	.160	ISH	.120	.120	.120	.120
DEC	.140	.100	.100	IIS	.200	.100
HARDNESS (MG/L)			DET'N LIMIT = .500		GUIDELINE = 80-100 (A4)	
JAN	139.500	128.500	129.500	125.500	125.500	128.000
FEB	147.500	133.500	137.000	134.000	133.000	133.500
MAR	158.000	137.000	137.000	141.500	138.000	137.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	168.000	133.000	135.000	136.000	134.000	133.500
MAY	148.500	133.000	134.000	130.000	129.000	132.000
JUN	134.000	127.000	134.000	134.000	133.000	133.000
JUL	147.000	133.000	137.000	137.000	137.000	135.000
AUG	144.000	134.000	131.000	129.000	130.000	130.000
SEP	150.000	133.000	140.000	140.000	135.000	129.000
OCT	150.000	130.000	132.000	131.000	131.000	132.000
NOV	163.000	ISM	133.000	134.000	133.000	131.000
DEC	181.000	134.000	133.000	IIS	128.000	130.000
MAGNESIUM (MG/L)			DET'N LIMIT = .050		GUIDELINE = 30. (F2)	
JAN	8.350	7.750	7.800	7.850	7.600	7.700
FEB	8.800	8.250	8.300	8.400	8.200	8.350
MAR	8.600	7.800	7.700	8.000	7.800	7.700
APR	9.800	8.000	7.900	7.600	7.900	7.900
MAY	8.400	8.100	7.800	7.700	7.700	7.800
JUN	8.000	7.900	8.350	8.480	8.410	8.310
JUL	8.200	7.500	7.600	7.800	7.700	7.600
AUG	8.500	8.300	8.300	8.300	8.100	8.000
SEP	9.100	8.700	8.600	8.700	8.500	8.300
OCT	9.400	8.600	8.700	8.700	8.700	8.500
NOV	9.800	ISM	8.400	8.500	8.300	8.400
DEC	10.400	8.300	8.200	IIS	7.900	7.900
SODIUM (MG/L)			DET'N LIMIT = .200		GUIDELINE = 200. (C3)	
JAN	11.200	10.700	10.900	11.100	10.900	11.100
FEB	12.200	12.300	13.000	12.500	12.400	12.400
MAR	11.000	10.900	11.100	11.600	11.200	11.000
APR	12.300	11.500	11.200	11.200	11.100	11.400
MAY	11.900	11.600	12.200	12.000	11.800	11.800
JUN	12.400	12.200	12.000	12.200	12.000	12.000
JUL	11.000	10.600	10.600	10.800	10.800	10.600
AUG	11.600	11.400	10.800	11.000	11.600	11.400
SEP	12.400	12.400	12.200	12.400	12.400	12.400
OCT	12.800	12.400	12.400	12.400	12.400	12.200
NOV	12.800	ILA	12.000	12.200	12.200	12.000
DEC	13.200	11.600	11.800	IIS	11.600	11.600
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .05 (F2)	
JAN	BDL	BDL	BDL	BDL	BDL	BDL
FEB	.004 <T	.004 <T	.004 <T	.004 <T	.016	.002 <T
MAR	.014	.006 <T	.002 <T	.006 <T	.018	.006 <T
APR	.020	.006 <T	.004 <T	.006 <T	.018	.004 <T
MAY	.026	.004 <T	.006 <T	.008 <T	.028	.006 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUN	.010	.010	.010	.012	.044	.010
JUL	.020	.006 <T	.006 <T	.010	.032	.004 <T
AUG	.012	.004 <T	.004 <T	.008 <T	.032	.006 <T
SEP	.004 <T	.006 <T	.006 <T	.010	.040	.002 <T
OCT	.006 <T	.004 <T	.002 <T	.008 <T	.008 <T	.004 <T
NOV	.010	!LA	.008 <T	.008 <T	.010	.006 <T
DEC	.002 <T	.012	.002 <T	!IS	.014	.006 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)	
JAN	BDL	BDL	BDL	BDL	BDL	BDL
FEB	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T
MAR	.005	.004 <T	.003 <T	.002 <T	.002 <T	.002 <T
APR	.003 <T	BDL	BDL	BDL	BDL	BDL
MAY	.001 <T	.001 <T	.001 <T	.001 <T	BDL	BDL
JUN	.024	.002 <T	.002 <T	.003 <T	.003 <T	.002 <T
JUL	.002 <T	.001 <T	.001 <T	.001 <T	.002 <T	.001 <T
AUG	.002 <T	.001 <T	.001 <T	.001 <T	.001 <T	.002 <T
SEP	.001 <T	.001 <T	.003 <T	.004 <T	.001 <T	.002 <T
OCT	.002 <T	.002 <T	.002 <T	.003 <T	.002 <T	.002 <T
NOV	.001 <T	!LA	.001 <T	.001 <T	BDL	.001 <T
DEC	.005	.008	.001 <T	!IS	.005	.006
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020		GUIDELINE = 10.000 (A1)	
JAN	.020 <T	.045 <T	.055 <T	.035 <T	.035 <T	.030 <T
FEB	.300	.315	.325	.320	.325	.315
MAR	.265	.285	.295	.290	.300	.300
APR	.455	.300	.295	.275	.295	.290
MAY	.290	.285	.280	.280	.295	.295
JUN	.330	.295	.295	.295	.310	.300
JUL	.285	.290	.310	.320	.285	.280
AUG	.205	.170	.145	.130	.215	.215
SEP	.115	.125	.220	.185	.170	.145
OCT	.115	.160	.175	.155	.155	.160
NOV	.135	!LA	.200	.175	.195	.195
DEC	.130 <T	!CR	!CR	!IS	BDL	BDL
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = .020		GUIDELINE = N/A	
JAN	.130	.090 <T	.090 <T	.090 <T	.240	.100
FEB	.280	.190	.250	.220	.280	.250
MAR	.300	.100	.180	.170	.310	.190
APR	.190	.090 <T	.100	.100	.120	.100
MAY	.160	.140	.140	.130	.200	.120
JUN	.160	.110	.130	.140	.270	.120
JUL	.180	.160	.120	.120	.250	.170

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
AUG	.110	.080 <T	.050 <T	.090 <T	.150	.070 <T
SEP	.180	.160	.100	.120	.230	.130
OCT	.110	.090 <T	.080 <T	.100	.290	.120
NOV	.190	ILA	.140	.170	.160	.170
DEC	BDL	BDL	.140	.160	.160	.150
PH (DIMENSIONLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
JAN	8.290	8.130	8.130	8.140	8.160	8.200
FEB	8.230	8.010	8.020	8.070	8.060	8.060
MAR	8.150	7.990	7.940	7.990	8.020	8.000
APR	8.220	8.150	8.030	8.060	8.140	8.100
MAY	8.120	7.900	8.390	8.380	8.320	8.320
JUN	8.280	8.020	8.330	8.330	8.340	8.350
JUL	8.390	8.310	8.310	8.310	8.310	8.320
AUG	8.170	7.850	7.910	7.940	8.020	7.960
SEP	8.300	8.050	8.000	7.990	8.050	8.050
OCT	8.270	8.110	8.110	8.130	8.150	8.150
NOV	8.290	ISM	8.220	8.220	8.200	8.200
DEC	8.300	8.150	8.010	8.320	8.100	8.080
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = .5UG/L		GUIDELINE = N/A	
JAN	.001 <T	BDL	.	.	.	.
FEB	.009	.000 <T	.	.	.	.
MAR	.010	BDL	.	.	.	.
APR	.008	.000 <T	.	.	.	.
MAY	.008	.000 <T	.	.	.	.
JUN	.008	.000 <T	.	.	.	.
JUL	.012	.001 <T	.	.	.	.
AUG	.009	BDL	.	.	.	.
SEP	.010	BDL	.	.	.	.
OCT	.011	.000 <T	.	.	.	.
NOV	.014	ILA	.	.	.	.
DEC	.011	.001 <T	.	.	.	.
PHOSPHORUS TTL-UNFIL (MG/L)			DET'N LIMIT = .002		GUIDELINE = .40 (F2)	
JAN	.017	.003 <T	.	.	.	.
FEB	.002	.002	.	.	.	.
MAR	.018	.002	.	.	.	.
APR	.018	.003 <T	.	.	.	.
MAY	.014	.003 <T	.	.	.	.
JUN	.010	BDL	.	.	.	.
JUL	.020	.006 <T	.	.	.	.
AUG	.220	BDL	.	.	.	.
SEP	.013	.004 <T	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	.019 <T	BDL	.	.	.	. .
NOV	.019	ILA	.	.	.	.
DEC	.030 <T	.010 <T	.	.	.	.
RESIDUE (TOTAL) (MG/L)		DET'N LIMIT = 1.		GUIDELINE = 500. (A3)		
JAN	222 CRO	210 CRO	210 CRO	211 CRO	209 CRO	204 CRO
FEB	229 CRO	211 CRO	214 CRO	213 CRO	215 CRO	213 CRO
MAR	220 CRO	204 CRO	205 CRO	205 CRO	205 CRO	206 CRO
APR	232	214 CRO	214 CRO	214 CRO	215 CRO	215 CRO
MAY	227 CRO	213 CRO	208 CRO	207 CRO	208 CRO	208 CRO
JUN	219 CRO	215 CRO	225 CRO	224 CRO	225 CRO	225 CRO
JUL	231 CRO	216 CRO	216 CRO	217 CRO	216 CRO	216 CRO
AUG	216 CRO	207 CRO	207 CRO	205 CRO	211 CRO	212 CRO
SEP	219 CRO	205 CRO	211 CRO	209 CRO	206 CRO	205 CRO
OCT	227 CRO	207 CRO	207 CRO	207 CRO	206 CRO	207 CRO
NOV	241 CRO	203 CRO	207 CRO	207 CRO	208 CRO	207 CRO
DEC	265 CRO	207 CRO	208 CRO	205 CRO	209 CRO	209 CRO
TURBIDITY (FTU)		DET'N LIMIT = .02		GUIDELINE = 1.00 (A1)		
JAN	1.250	.160	.490	.440	.390	.210
FEB	1.080	.940	.320	.360	.420	.360
MAR	1.000	.100	.260	.440	.530	.150
APR	1.230	.220	.860	.330	.940	.220
MAY	.920	.090	.580	.410	.330	.260
JUN	.780	.140	.350	.400	.440	.360
JUL	.650	.070	.360	.370	.340	.240
AUG	.560	.100	.410	.440	.320	.340
SEP	.630	.300	.670	.970	.460	.430
OCT	.450	.490	.400	.680	.310	.240
NOV	.370	ISM	.310	.340	.180	.180
DEC	.710	.050	.300	IIS	.240	.310

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
ALUMINUM (MG/L)			DET'N LIMIT = .004	GUIDELINE = .10 (A4)		
JAN	.041	.069	.057	.056	.057	.056
FEB	.021	.053	.050	.048	.042	.039
MAR	.005	.061	.047	.056	.055	.057
APR	.045	.061	.037	.032	.030	.040
MAY	.017	.098	.059	.061	.065	.057
JUN	BDL	.074	.042	.048	.045	.047
JUL	BDL	.060	.043	.044	.065	.060
AUG	.038	.150	.072	.099	.082	.091
SEP	.021	.190	.098	.092	.130	.130
OCT	.019	.130	.084	.110	.100	.110
NOV	.016	.090	.063	.069	.068	.067
DEC	.012	.062	.045	ISM	.042	.038
BARIUM (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1.000 (A1)		
JAN	.032	.022	.024	.021	.021	.021
FEB	.029	.019	.019	.018	.017	.017
MAR	.036	.024	.023	.023	.023	.022
APR	.045	.019	.023	.021	.020	.021
MAY	.029	.020	.019	.019	.020	.019
JUN	.026	.021	.019	.021	.021	.020
JUL	.038	.023	.024	.024	.025	.023
AUG	.028	.019	.019	.019	.021	.021
SEP	.032	.020	.022	.021	.020	.020
OCT	.034	.017	.017	.017	.017	.017
NOV	.032	.015	.016	.015	.015	.016
DEC	.042	.018	.019	ISM	.015	.014
BORON (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 5.000 (A1)		
JAN	.040	.030	.020	.030	BDL	BDL
FEB	.030	.030	.030	.030	.030	.030
MAR	.030	.020	.030	.030	.040	.030
APR	.030	.020	.020	.020	.030	.030
MAY	BDL	.020 <T	.030 <T	.020 <T	.020 <T	.020 <T
JUN	.040	.030	.020	.020	.020	.040
JUL	.020 <T	.020 <T	.010 <T	.010 <T	.010 <T	.010 <T
AUG	.020 <T	.020 <T	.030 <T	.030 <T	.030 <T	.020 <T
SEP	.040 <T	.030 <T	.020 <T	.030 <T	.030 <T	.030 <T
OCT	.030 <T	.020 <T	.020 <T	.020 <T	.030 <T	.030 <T
NOV	.060	.040	.030 <T	.040 <T	.040 <T	.040 <T
DEC	.040 <T	.033 <T	.031 <T	.033 <T	.042 <T	.039 <T
CADMIUM (UG/L)			DET'N LIMIT = 0.300	GUIDELINE = 5.000 (A1)		
JAN	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.400	BDL	BDL	BDL
DEC	BDL	BDL	BDL	ISH	BDL	BDL
COBALT (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.0 (N)	
JAN	BDL	BDL	BDL	BDL	BDL	BDL
FEB	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	.001	.001	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	.001	BDL	.001	ISH	BDL	BDL
CHROMIUM (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .05 (A1)	
JAN	BDL	BDL	BDL	BDL	BDL	BDL
FEB	BDL	BDL	BDL	BDL	BDL	BDL
MAR	.001	BDL	BDL	BDL	BDL	BDL
APR	.002	BDL	BDL	BDL	BDL	.001
MAY	BDL	BDL	BDL	BDL	BDL	.001
JUN	BDL	.001	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	.001	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	.002	.001	.002	.002	.002	.002
NOV	.002	.001	.001	.001	.001	.001
DEC	.002	.002	.002	ISH	.002	.001
COPPER (MG/L)			DET'N LIMIT = .001		GUIDELINE = 1.0 (A3)	
JAN	.086	.002	.097	.006	.007	.003
FEB	.049	BDL	.088	.001	.003	BDL
MAR	.078	.001	.024	.005	.009	.004

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.099	.001	.040	.005	.007	.003
MAY	.074	.001	.006	.004	.009	.002
JUN	.017	.002	.029	.005	.008	.003
JUL	.086	.002	.025	.006	.008	.003
AUG	.096	.001	.060	.004	.013	.004
SEP	.200	.001	.058	.006	.007	.003
OCT	.190	.002	.072	.005	.009	.003
NOV	.130	BDL	.039	.005	.008	.002
DEC	.230	.002	.139	ISM	.009	.002
IRON (MG/L)			DET'N LIMIT = .002		GUIDELINE = .300 (A3)	
JAN	.028	BDL	.120	.120	.048	.050
FEB	.015	BDL	.110	.110	.046	.049
MAR	.020	BDL	.110	.120	.055	.060
APR	.027	BDL	.140	.140	.068	.075
MAY	.019	BDL	.120	.120	.066	.074
JUN	.027	.004	.110	.110	.110	.092
JUL	.013	BDL	.110	.110	.067	.080
AUG	.016	BDL	.083	.100	.071	.058
SEP	.015	BDL	.130	.140	.058	.068
OCT	BDL	BDL	.120	.120	.047	.050
NOV	BDL	BDL	.098	.094	.041	.044
DEC	.017	BDL	.118	ISM	.056	.061
MERCURY (UG/L)			DET'N LIMIT = 0.010		GUIDELINE = 1.000 (A1)	
JAN	.010	.010	.	BDL	.	.010
FEB	.020	.010	.	.010	.	BDL
MAR	.010	.010	.	BDL	.	BDL
APR	.010	.010	.	.010	.	BDL
MAY	BDL	.020	.	BDL	.	.040
JUN	.010	.020	.	BDL	.	BDL
JUL	.040	.040	.	BDL	.	BDL
AUG	.010	.010	.	.010	.	.010
SEP	.010	.010	.	.020	.	BDL
OCT	.030	.030	.	.030	.	BDL
NOV	.020	.030	.	.020	.	BDL
DEC	.020	.020	.	.030	.	.010
MANGANESE (MG/L)			DET'N LIMIT = .001		GUIDELINE = .050 (A3)	
JAN	.003	BDL	.005	.005	.004	.004
FEB	.002	BDL	.004	.004	.003	.004
MAR	.006	BDL	.005	.005	.004	.004
APR	.009	BDL	.005	.005	.004	.004
MAY	.002	BDL	.005	.005	.004	.004

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
JUN	.005	BDL	.005	.005	.004	.004
JUL	.011	.001	.006	.006	.005	.006
AUG	.015	BDL	.005	.006	.007	.008
SEP	.022	BDL	.007	.007	.004	.005
OCT	.006	BDL	.006	.006	.004	.005
NOV	.014	BDL	.005	.005	.004	.004
DEC	.012	.001	.006	ISH	.004	.004
MOLYBDENUM (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .50 (H)	
JAN	.001	.001	BDL	BDL	.001	.001
FEB	.001	.001	BDL	BDL	BDL	BDL
MAR	.001	.001	BDL	BDL	.001	BDL
APR	BDL	BDL	BDL	BDL	.001	.001
MAY	.001	.001	BDL	BDL	BDL	.001
JUN	.001	.001	BDL	BDL	BDL	BDL
JUL	.001	.001	BDL	BDL	.001	.001
AUG	BDL	.001	BDL	BDL	.001	BDL
SEP	.001	.001	BDL	BDL	.001	BDL
OCT	.001	BDL	.001	BDL	BDL	BDL
NOV	.002	.001	BDL	BDL	BDL	.001
DEC	.001	.001	.001	ISH	.001	.001
NICKEL (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .05 (F3)	
JAN	BDL	BDL	BDL	.002	BDL	BDL
FEB	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	.002	BDL	.002	BDL	.002
MAY	BDL	.002	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	.002	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	.002
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	.002	.001	.001	.002	.002	.002
NOV	.002	.002	.002	.001	.002	.002
DEC	.002	.002	.002	ISH	.002	.001
LEAD (MG/L)			DET'N LIMIT = 0.003		GUIDELINE = .050 (A1)	
JAN	BDL	BDL	.013	BDL	BDL	BDL
FEB	BDL	BDL	.017	.004	.004	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	.004	.004	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	.003	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	.005	.004	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
AUG	.003	.003	.009	BDL	.006	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	.014	.004	BDL	BDL
NOV	BDL	BDL	.004	BDL	BDL	BDL
DEC	.003	BDL	.013	!SM	BDL	BDL
STRONTIUM (MG/L)			DET'N LIMIT = .001		GUIDELINE = 2.00 (H)	
JAN	.570	.180	.180	.170	.170	.180
FEB	.650	.160	.160	.160	.150	.150
MAR	.730	.190	.190	.190	.190	.190
APR	1.100	.160	.190	.180	.180	.180
MAY	.550	.170	.160	.160	.160	.160
JUN	.380	.180	.170	.180	.170	.170
JUL	.700	.180	.180	.180	.190	.170
AUG	.470	.160	.150	.150	.160	.160
SEP	.570	.170	.170	.170	.170	.170
OCT	.602	.150	.150	.150	.150	.150
NOV	.990	.140	.140	.140	.140	.140
DEC	.566	.170	.169	!SM	.140	.130
URANIUM (UG/L)			DET'N LIMIT = .02		GUIDELINE = 20. (A2)	
JAN	.400	.360	.280	.330	.330	.320
FEB	.410	.360	.340	.360	.340	.340
MAR	.340	.300	.300	.300	.270	.270
APR	.310	.230	.180	.240	.220	.230
MAY	.320	.280	.280 <T	.280 <T	.280 <T	.260 <T
JUN	.340	.310	.290	.280	.290	.290
JUL	.270	.220	.210	.210	.240	.240
AUG	.310	.310	.260	.260	.260	.260
SEP	.320	.340	.320	.270	.330	.350
OCT	.360	.320	.320	.320	.310	.340
NOV	.400	.350	.300	.310	.310	.320
DEC	.410	.290	.280	.270	.300	.300
ZINC (MG/L)			DET'N LIMIT = .001		GUIDELINE = 5.00 (A3)	
JAN	BDL	BDL	.062	BDL	.004	.001
FEB	.005	BDL	.058	.004	.005	.005
MAR	.003	BDL	.003	.001	.004	.001
APR	.004	.005	.023	.001	.004	.001
MAY	BDL	.003	.001	.002	.009	BDL
JUN	.004	.004	.022	.003	.007	.003
JUL	.008	.010	.030	BDL	.010	BDL
AUG	.003	.002	.019	.001	.009	.007
SEP	BDL	BDL	.011	BDL	.006	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	.003	BDL	.043	BDL	.009	.003
NOV	BDL	BDL	.015	.003	.009	BDL
DEC	.005	.003	.086	!SH	.006	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROBUTADIENE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 450. (D4)	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	2.000 <T
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	5.000 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	!SM
DEC	BDL	BDL	.	!IS	.	!LA
123 TRICHLOROBENZENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 10000. (I)	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	5.000 <T	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	!SM
DEC	BDL	BDL	.	!IS	.	!LA
1235 T-CHLOROBENZENE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 10000. (I)	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	3.000 <T	.	3.000 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	!SM
DEC	BDL	BDL	.	!IS	.	!LA
124 TRICHLOROBENZENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 10000. (I)	
JAN	BDL	BDL	.	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	5.000 <T	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	11.000 <T	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	ISM
DEC	BDL	BDL	.	IIS	.	ILA
135 TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 10000. (D4)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	6.000 <T	.	BDL
AUG	BDL	7.000 <T	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	ISM
DEC	BDL	BDL	.	IIS	.	ILA
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900. (D4)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	12.000
APR	BDL	BDL	.	1.000 <T	.	BDL
MAY	BDL	BDL	.	12.000	.	2.000 <T
JUN	BDL	5.000 <T	.	BDL	.	BDL
JUL	BDL	1.000 <T	.	3.000 <T	.	2.000 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	ISM
DEC	BDL	BDL	.	IIS	.	ILA
PENTACHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 74000. (D4)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
APR	BDL	BDL	.	BDL	.	1.000 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	!SM
DEC	BDL	BDL	.	!IS	.	!LA
236 TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	7.000 <T	.	6.000 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	!SM
DEC	BDL	BDL	.	!IS	.	!LA
245 TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	8.000 <T	.	5.000 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	!SM
DEC	BDL	BDL	.	!IS	.	!LA

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700. (G)	
JAN	BDL	2.000 <T	.	2.000 <T	.	2.000 <T
FEB	2.000 <T	3.000 <T	.	3.000 <T	.	2.000 <T
MAR	1.000 <T	BDL	.	1.000 <T	.	4.000 <T
APR	2.000 <T	1.000 <T	.	2.000 <T	.	2.000 <T
MAY	2.000 <T	2.000 <T	.	2.000 <T	.	4.000 <T
JUN	1.000 <T	2.000 <T	.	2.000 <T	.	2.000 <T
JUL	1.000 <T	2.000 <T	.	2.000 <T	.	2.000 <T
AUG	BDL	1.000 <T	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	1.000 <T	BDL	.	BDL	.	2.000 <T
NOV	1.000 <T	1.000 <T	.	1.000 <T	.	ISM
DEC	1.000 <T	2.000 <T	.	IIS	.	ILA
LINDANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 4000.0 (A1)	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	1.000 <T	1.000 <T	.	1.000 <T	.	BDL
MAR	BDL	BDL	.	BDL	.	1.000 <T
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	1.000 <T
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	2.000 <T	.	1.000 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	ISM
DEC	BDL	BDL	.	IIS	.	ILA

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS						
PHENOL (UG/L)			DET'N LIMIT = 0.2		GUIDELINE = 2.00 (A3)	
JAN	BDL	.400 <T	.	.400 <T	.	.400 <T
FEB	BDL	BDL	.	.	.	.
MAR	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
MAY	38.600	46.000	.	.	.	.
JUN	.400 <T	.800 <T	.	.	.	.
JUL	.200 <T	.200 <T	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.200 <T	.400 <T	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	.200 <T	.200 <T	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SPECIFIC PESTICIDES						
ATRAZINE (NG/L)			DET'N LIMIT = 50.00		GUIDELINE = 60000. (B3)	
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	130.000 <T	.	.
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	INR	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
TOLUENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 100.0 (G)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	.100 <T	.100 <T	.	.200 <T	.	.100 <T
DEC	BDL	.050 <T	.	.200 <T	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 3400. (D3)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	.150 <T	BDL	.	BDL	.	BDL
NOV	.050 <T	.100 <T	.	BDL	.	BDL
DEC	BDL	.100 <T	.	.150 <T	.	BDL
P-XYLENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 620. (G)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	.000 RMP	.	.000 RMP	.	BDL
M-XYLENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 620. (G)		
JAN	BDL	BDL	.	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	.200 <T	.	.500 <T	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)	
JAN	BDL	21.000	.	13.000	.	17.000
FEB	BDL	11.000	.	7.000	.	9.000
MAR	BDL	37.000	.	22.000	.	24.000
APR	BDL	17.000	.	16.000	.	16.000
MAY	1.000	17.000	.	13.000	.	13.000
JUN	.700 <T	15.000	.	10.000	.	15.000
JUL	BDL	23.000	.	12.000	.	15.000
AUG	BDL	22.500	.	14.800	.	16.900
SEP	BDL	19.600	.	13.400	.	14.400
OCT	BDL	18.600	.	12.100	.	11.900
NOV	BDL	13.900	.	7.900	.	8.400
DEC	BDL	14.800	.	7.800	.	10.000
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)	
JAN	BDL	12.000	.	8.000	.	9.000
FEB	BDL	8.000	.	7.000	.	8.000
MAR	BDL	13.000	.	9.000	.	10.000
APR	BDL	11.000	.	8.000	.	10.000
MAY	BDL	11.000	.	9.000	.	9.000
JUN	BDL	11.000	.	8.000	.	10.000
JUL	BDL	14.000	.	8.000	.	10.000
AUG	BDL	13.600	.	9.300	.	10.700
SEP	BDL	13.300	.	9.700	.	10.600
OCT	BDL	14.100	.	8.800	.	8.600
NOV	BDL	11.000	.	6.600	.	7.000
DEC	BDL	13.100	.	7.600	.	9.600
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1+)	
JAN	BDL	4.000	.	3.000	.	3.000
FEB	BDL	4.000	.	3.000	.	4.000
MAR	BDL	2.000	.	2.000	.	2.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	BDL	3.000	.	2.000	.	3.000
MAY	BDL	5.000	.	4.000	.	4.000
JUN	BDL	5.000	.	4.000	.	4.000
JUL	BDL	6.000	.	3.000	.	4.000
AUG	BDL	5.100	.	4.000	.	3.900
SEP	BDL	5.700	.	3.900	.	4.300
OCT	BDL	6.900	.	4.900	.	4.900
NOV	BDL	5.100	.	3.500	.	3.700
DEC	BDL	5.200	.	3.500	.	4.600
BROMOFORM (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1+)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	.200 <T	.	BDL	.	BDL
OCT	BDL	.400 <T	.	.400 <T	.	.400 <T
NOV	BDL	.200 <T	.	.200 <T	.	.200 <T
DEC	BDL	BDL	.	BDL	.	BDL
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1)		
JAN	BDL	37.000	.	24.000	.	29.000
FEB	BDL	23.000	.	17.000	.	21.000
MAR	BDL	52.000	.	33.000	.	26.000
APR	BDL	31.000	.	26.000	.	29.000
MAY	1.000	33.000	.	26.000	.	26.000
JUN	.700	31.000	.	22.000	.	29.000
JUL	BDL	43.000	.	23.000	.	29.000
AUG	BDL	41.200	.	28.100	.	31.500
SEP	BDL	38.800	.	27.000	.	29.300
OCT	BDL	40.000	.	26.200	.	25.800
NOV	BDL	30.200	.	18.200	.	19.300
DEC	BDL	33.100	.	18.900	.	24.200

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
CHEMISTRY (LAB)	CYANIDE	48	0.001	.200 (A1)	MG/L
METALS	ARSENIC	72	0.001	.050 (A1)	MG/L
	BERYLLIUM	72	0.001	.0002 (H)	MG/L
	CYANIDE	48	0.001	.200 (A1)	MG/L
	SELENIUM	72	0.001	.010 (A1)	MG/L
	VANADIUM	72	.001	.10 (H)	MG/L
CHLOROAROMATICS	1234 T-CHLOROBENZENE	48	1.000	10000. (I)	NG/L
	1245 T-CHLOROBENZENE	48	1.000	38000. (D4)	NG/L
	OCTACHLOROSTYRENE	48	1.000	N/A	NG/L
	26A TRICHLOROTOLUENE	48	5.000	N/A	NG/L
CHLOROPHENOLS	234 TRICHLOROPHENOL	4	50.	N/A	NG/L
	2345 T-CHLOROPHENOL	4	50.	N/A	NG/L
	2356 T-CHLOROPHENOL	4	50.	N/A	NG/L
	245-TRICHLOROPHENOL	4	50.	2600000(D4)	NG/L
	246-TRICHLOROPHENOL	4	50.	10000. (C1)	NG/L
	PENTACHLOROPHENOL	4	50.	10000. (C1)	NG/L
PAH	PHENANTHRENE	8	0	N/A	NG/L
	ANTHRACENE	8	0	N/A	NG/L
	FLUORANTHENE	8	0	42000 (D4)	NG/L
	PYRENE	8	0	N/A	NG/L
	BENZO(A)ANTHRACENE	8	0	N/A	NG/L
	CHRYSENE	8	0	N/A	NG/L
	DIMETH. BENZ(A)ANTHR	8	0	N/A	NG/L
	BENZO(E)PYRENE	8	0	N/A	NG/L
	BENZO(J) FLUORANTHEN	8	N/A	N/A	NG/L
	BENZO(B) FLUORANTHEN	8	0	N/A	NG/L
	PERYLENE	8	0	N/A	NG/L
	BENZO(K) FLUORANTHEN	8	N/A	N/A	NG/L
	BENZO (A) PYRENE	8	0	10 (B1)	NG/L
	BENZO(G,H,I) PERYLEN	8	0	N/A	NG/L
	DIBENZO(A,H) ANTHRAC	8	0	N/A	NG/L
	INDENO(1,2,3-C,D) PY	8	0	N/A	NG/L
	BENZO(B) CHRYSENE	8	0	N/A	NG/L
	ANTHANTHRENE	8	N/A	N/A	NG/L
	CORONENE	8	0	N/A	NG/L
PESTICIDES & PCB	ALDRIN	48	1.000	700.0 (A1)	NG/L
	BETA BHC	48	1.000	300. (G)	NG/L
	ALPHA CHLORDANE	48	2.000	7000.0 (A1)	NG/L
	GAMMA CHLORDANE	48	2.000	7000.0 (A1)	NG/L
	DIELDRIN	48	2.000	700.0 (A1)	NG/L
	METHOXYCHLOR	48	5.000	100000.(A1)	NG/L
	THIODAN I	48	2.000	74000. (D4)	NG/L
	THIODAN II	48	4.000	74000. (D4)	NG/L
	ENDRIN	48	4.000	200.0 (A1)	NG/L
	THIODAN SULPHATE	48	4.000	N/A	NG/L
	HEPTACHLOR EPOXIDE	48	1.000	3000.0 (A1)	NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
PESTICIDES & PCB	HEPTACHLOR	48	1.000	3000.0 (A1)	NG/L
	MIREX	48	5.000	N/A	NG/L
	OXYCHLORDANE	48	2.000	N/A	NG/L
	OPDDT	48	5.000	30000. (A1)	NG/L
	PCB	48	20.000	3000. (A2)	NG/L
	PP-DDD	48	5.000	N/A	NG/L
	PPDDE	48	1.000	30000. (A1)	NG/L
	PPDDT	48	5.000	30000. (A1)	NG/L
	ATRATONE	47	50.	N/A	NG/L
	ALACHLOR	47	500.	35000. (D2)	NG/L
	ETHYLENE DIBROMIDE	48	0	50.0 (G)	UG/L
	HCB	48	1.000	10.0 (C1)	NG/L
SPECIFIC PESTICIDES	TOXAPHENE	48	N/A	5000. (A1)	NG/L
	AMETRYNE	47	50.00	300000.(D3)	NG/L
	BLADEX	47	100.00	10000. (B3)	NG/L
	PROMETONE	47	50.00	52500. (D3)	NG/L
	PROPAZINE	47	50.00	16000. (D2)	NG/L
	PROMETRYNE	47	50.00	1000. (B3)	NG/L
	SENCOR	47	100.00	80000. (B2)	NG/L
	SIMAZINE	47	50.00	10000. (B3)	NG/L
	2,4,5-T	4	50.00	35000. (D2)	NG/L
	2,4-D	4	100.00	100000.(A1)	NG/L
	24DCHLRPHENOXYBUTYRC	4	200.00	18000. (B3)	NG/L
	2,4-DP	4	100.00	N/A	NG/L
	DICAMBA	4	100.00	87000. (B3)	NG/L
	PICHLORAM	4	100.00	2450000(D3)	NG/L
	SILVEX	4	50.00	10000. (A1)	NG/L
	DIAZINON	4	20.	14000. (A1)	NG/L
	DICHLOROVOS	4	20.	N/A	NG/L
	DURSBAN	4	20.	N/A	NG/L
	ETHION	4	20.	35000. (G)	NG/L
	GUTHION	4	N/A	N/A	NG/L
	MALATHION	4	20.	160000. (G)	NG/L
	MEVINPHOS	4	20.	N/A	NG/L
	METHYL PARATHION	4	50.	7000. (B3)	NG/L
	METHYLTRITHION	4	20.	N/A	NG/L
	PARATHION	4	20.	35000. (B1)	NG/L
	PHORATE	4	20.	35.0 (D2)	NG/L
	RELDAN	4	20.	N/A	NG/L
	RONNEL	4	20.	N/A	NG/L
	AMINOCARB	4	N/A	N/A	NG/L
	BENOMYL	4	N/A	N/A	NG/L
	BUX	4	2000.	N/A	NG/L
	CARBOFURAN	4	2000.	18000. (D3)	NG/L
	CIPC	4	2000.	350000. (G)	NG/L
	DIALLATE	4	2000.	30000. (H)	NG/L
	EPTAM	4	2000.	N/A	NG/L
	IPC	4	2000.	N/A	NG/L
	PROPOXUR	4	2000.	90000. (G)	NG/L
	SEVIN	4	200.	70000. (A1)	NG/L
	SUTAN	4	2000.	245000.(D3)	NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM KINGSTON WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
SPECIFIC PESTICIDES	METOLACHLOR	47	500.	50000. (B3)	NG/L
VOLATILES	BENZENE	48	0	5.0 (D1)	UG/L
	O-XYLENE	48	0	620. (G)	UG/L
	1,1 DICHLOROETHYLENE	48	0	7.0 (D1)	UG/L
	DICHLOROMETHANE	48	0	1750. (D3)	UG/L
	T1,2DICHLOROETHYLENE	48	0	350. (D3)	UG/L
	1,1 DICHLOROETHANE	48	0	N/A	UG/L
	111, TRICHLOROETHANE	48	0	200. (D1)	UG/L
	1,2 DICHLOROETHANE	48	0	5.0 (D1)	UG/L
	CARBON TETRACHLORIDE	48	0	5.0 (D1)	UG/L
	1,2 DICHLOROPROPANE	48	0	10.0 (G)	UG/L
	TRICHLOROETHYLENE	48	0	5.0 (D1)	UG/L
	112 TRICHLOROETHANE	48	0	.60 (D4)	UG/L
	T-CHLOROETHYLENE	48	0	10.0 (C2)	UG/L
	1122 T-CHLOROETHANE	48	0	0.17 (D4)	UG/L
	CHLOROBENZENE	48	0	1510. (D3)	UG/L
	1,4 DICHLOROBENZENE	48	0	75.0 (D1)	UG/L
	1,3 DICHLOROBENZENE	48	0	130. (G)	UG/L
	1,2 DICHLOROBENZENE	48	0	130. (G)	UG/L
	TRIFLUOROCHLOROTOLUE	48	0	N/A	UG/L
	ETHYLENE DIBROMIDE	48	0	50.0 (G)	UG/L

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and

missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free,combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 160 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information

This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

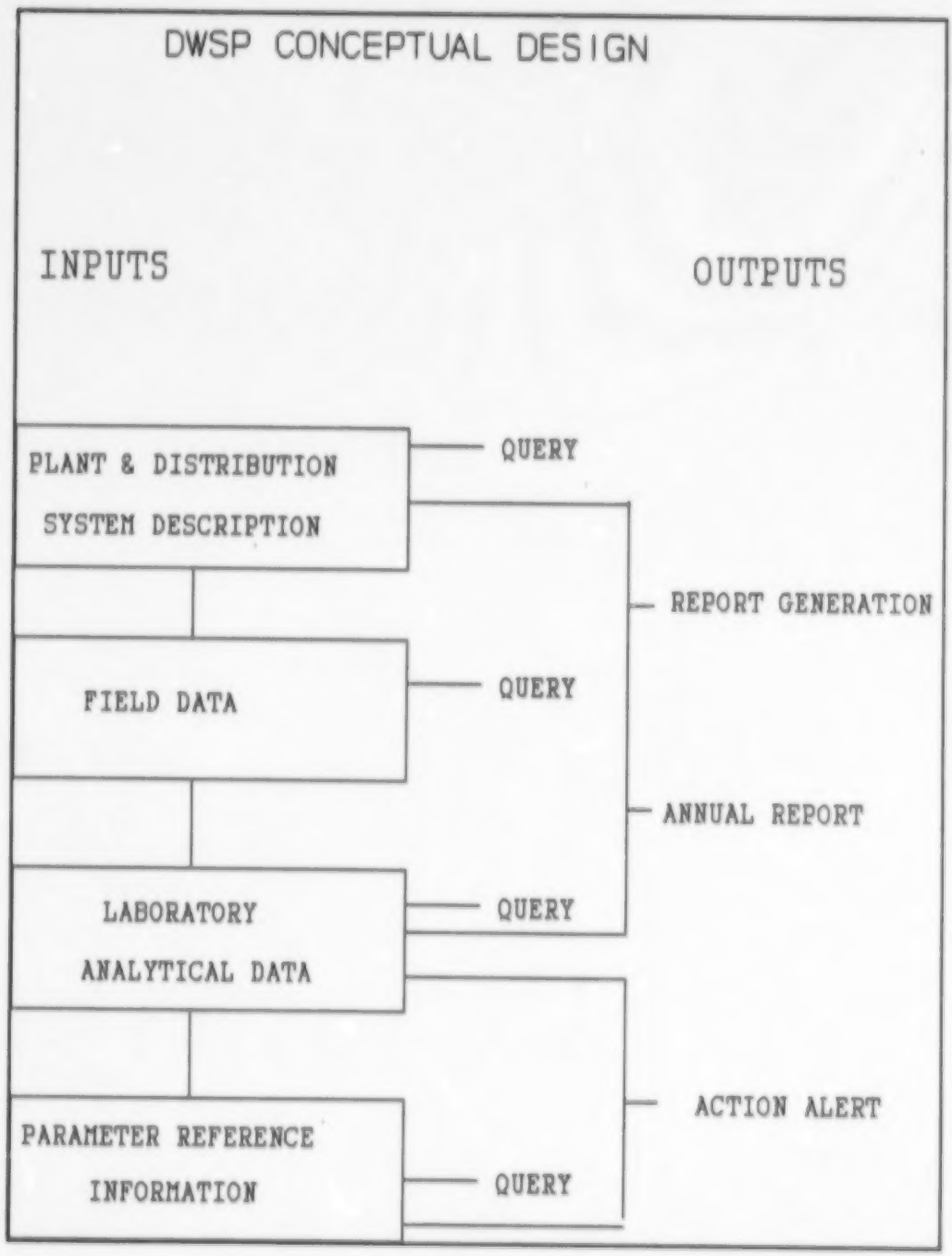
DWSP CONCEPTUAL DESIGN
INPUTS
OUTPUTS
PLANT & DISTRIBUTION SYSTEM DESCRIPTION
FIELD DATA
LABORATORY ANALYTICAL DATA
PARAMETER REFERENCE INFORMATION
QUERY
QUERY
QUERY
QUERY
REPORT GENERATION
ANNUAL REPORT
ACTION ALERT

FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P) PARAMETER
REFERENCE
BENZENE

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA	C 86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA	C 80/11		NOMETH	6.60	063000 UG/L	
FERC	C 84/05		NOMETH	1.00	063000 UG/L	
WHO	C 84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE
CAS#: 71432
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L
SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27), CYCLOHEXATRIENE (41)
CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)
PROPERTIES:
SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)
THRESHOLD ODOUR: NO DATA
THRESHOLD TASTE: 0.5 MG/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMUALTE IN LIVING ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL QUANITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY
SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL TAR DISTILLATION, FOOD PROCESSING, TANNING.
USES: PREPERATION OF ETHYL BENZENE USED AS A STYRENE MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY, DEGREASING AND CLEANSING AGENT, GASOLINE.
TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES MUCOUS MEMBRANES, SYMPTONS INCLUDE RESTLESSNESS, CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE; CHRONIC - ANEMIA AND LEUKEMIA (45).
CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN
REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM FOLLOWED BY SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).
MOLECULAR WEIGHT: 78.12 GRAMS
MELTING POINT: 5.5 DEGREES C (27)
BOILING POINT: 80.1 DEGREES C (27)
SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)
VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C
HENRY'S LAW CONSTANT: 0.00555 ATM M^3/MOLE
LOG OCT./WATER PAR.COEFF: K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle -tilt bottle when filling -fill bottle completely; there should be no air bubbles.
Organic (OWOC),(OWTRI),(OAPAHX)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle -fill to approx. 1" from top -when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)

Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and $KCrO_7$ corrosive)
Phenols	-250 mL clear glass bottle -do <u>not</u> rinse bottle -fill to top of label as marked

<u>Steps</u>

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL clear palstic bottle -rinse bottle with sample three times and discard -fill to line
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle; preservative has been added -tilt bottle when filling -fill bottle completely; there should be no air bubbles
Organic (OWOC),(OWTRI)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)
Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and KCrO7 corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for ten minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), tubidity and pH on submission sheet.